NON-TUBERCULOUS OSTEOMYELITIS OF THE OS CALCIS.

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In this paper no distinction is made between osteitis and osteomyelitis. The word osteomyelitis has been selected to cover all non-tubercular inflammations involving the calcaneum.

History.—In 1814 Monteggia excised the os calcis for osteomyelitis and, so far as I am able to learn, the affection had not been given consideration previous to that time. Then for 45 years osteomyelitis of the os calcis does not seem to be mentioned in medical literature. In 1859 Polaillon[1] discussed the condition from clinical and pathological standpoints; and, in the same year, M. Sedillot[2] elaborated its operative treatment. In 1870 Burrall[3] reported a case treated at Bellevue and Fergusson[4] reported one case in 1874. During the years 1876, '77, and '78, three articles were published regarding osteomyelitis of the os calcis. Vincent[5] discussed its operative treatment; Lebecq[6] reported a case in an adult who had sustained no injury to the part; and Schinzinger,[7] who wrote the most exhaustive article I have been able to find on this subject, reported six cases. Since 1878 Zwicke,[8] Owen,[9] and Senn[10] report one case each.

Frequency.—Osteomyelitis of the os calcis is, according to medical literature, a rare condition. Although it has received little attention, it is probable that it occurs more frequently than the reports would indicate. Schinzinger believes that it is not so very rare and says that Ollier knew of 100 cases occurring in 16 years. I have treated 3 cases; and have knowledge of 2 treated successfully but not reported. T. Holmes and M. Markal state that many cases of caries, limited to one bone of the tarsus, are seen especially in children.

Etiology.—Osteomyelitis of the os calcis is as a rule a disease of childhood. Of the reported cases only one (Lebecq's) occurred in an adult. It is found most often between the ages of 6 and 10 years; and, according to Owen is very rare after puberty. It is most often secondary to wounds of the heel, but as in Lebecq's case it may occur unassociated with injuries or local infections. The location and anatomy of the os calcis are factors predisposing to inflammatory involvement of this bone. It is the largest of the tarsal bones and, bearing most of the weight of the body, is exposed to traumatism.

The os calcis, during childhood, may be considered as a diaphysis of spongy bone having a posterior cartilaginous epiphysis. Ossification begins about the tenth year, the two parts of the bone uniting shortly after puberty. Several moderately large arteries and veins enter and leave the os calcis,—especially on its inner side,—affording an opportunity for infection in the soft structures of the heel to invade the bone. It does not seem probable that the lymphatics play an important part in the occurrence of osteomyelitis of the os calcis.

Pathology.—The pathology of osteomyelitis of the os calcis does not differ from that of the same disease in other bones. While it is most often secondary to local infection, it occurs without previous local changes (Owen and Lebecq), and may be a part of infection involving many bones (Owen). Sequestration is the rule, but no sequestra may be found in children under 7 years of age. In patients from 10 to 12 years old one or two large sequestra are frequently found. They are more or less globular and measure from one-half to three-quarters of an inch in the longest diameter. In the museum of St. Bartholomew's Hospital (Sp. No. 195) there is a specimen of osteomyelitis of the os calcis with a large sequestrum. In advanced cases the entire substance of the bone is destroyed, leaving only a thin periosteal shell. But even in these cases regeneration from the periosteum will in time, if the infection has been terminated, apparently completely replace the bone,

diminishing the deformity and rendering the foot functionally perfect.

The bacteriology of osteomyelitis of the os calcis has not received attention. In the 3 cases that I treated, sinuses had formed and mixed infection was present.

Symptoms.—The symptoms of osteomyelitis of the os calcis are the general symptoms of a septic infection associated with local manifestations referred to the heel. The general symptoms vary greatly in their intensity. In the early stages a sudden onset with a marked chill, high temperature, rapid pulse-rate and evidences of profound intoxication may be associated with moderate pain and tenderness only with deep and continuous pressure over the heel; while the local pain and tenderness may be marked and the general symptoms comparatively mild in the cases in which the infection is less virulent.

For practical purposes the symptoms of osteomyelitis of the os calcis may be divided into two classes: (1) those complicating wounds of the heel, and (2) those in which the heel has not been injured. In the cases unassociated with wounds, the os calcis may be involved alone, or multiple osteomyelitis may be present. Lebecq reports the case of a man who had pain in the heel and later developed septic symptoms. There was no swelling, œdema or redness over the os calcis. No wound was present; neither was there a history of injury. After being septic about 9 weeks the patient died. Shortly before death an abscess developed in the heel but it was not drained. Postmortem showed osteomyelitis of the os calcis with a sequestrum as the cause of the sepsis. In this class of cases it is to be expected that pain would be marked in the early stages; that swelling, redness and superficial tenderness would occur only after the inflammatory process had extended from the bone to the soft structures; that the formation of a communication between the bone-marrow and the soft structures would markedly diminish the pain; and that spontaneous drainage to the surface would relieve both the local and general symptoms.

Owen reports a case of osteomyelitis in which the ulna, tibia and os calcis were simultaneously involved. In cases of multiple septic osteomyelitis it is well to keep in mind that the os calcis may become involved; and, as Kirmissen has said, osteomyelitis may affect any bone in the body.

In the cases of osteomyelitis of the os calcis following wounds there is a disproportion between the general septic symptoms with pain in the heel and the local swelling with superficial tenderness. The pain may be intense and the toxæmia marked while the tenderness and swelling are slight. Such a condition progresses in severity until artificial or spontaneous drainage is secured. Then the local and general symptoms suddenly improve markedly and a discharging sinus remains. Vincent says that 5 per cent. of these cases die if untreated or if proper surgical treatment is unduly delayed. It is probable that osteomyelitis of the os calcis, like osteomyelitis in other bones, may occur in all degrees of severity. Schinzinger says that the affection may be so mild that it does not result in necrosis.

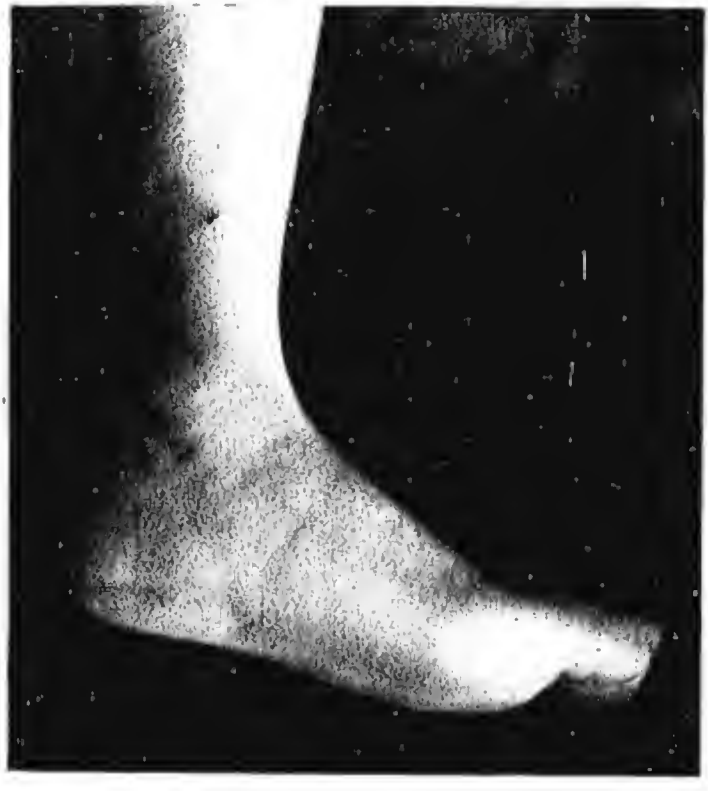
Diagnosis.—What has been said regarding symptomatology indicates the factors that speak for or against the presence of osteomyelitis of the os calcis. If the condition has at times been overlooked, I believe it has been because it was not thought of rather than from inability to recognize it from the signs and symptoms obtainable. Septic or rheumatic involvements of the ankle-joint result in more diffuse swelling, and the anterior ligaments of the ankle are tender and present a fulness not found in disease of the os calcis. Movement of the joint increases the pain in diseases of the ankle, while this is not the case in osteomyelitis of the heel. Tuberculosis of the ankle-joint, or tarsal bones, may present difficulties in diagnosis. Tuberculosis is, as a rule, less intense at the beginning; it results in more atrophy and contracture of the muscles of the leg, and may be associated with general symptoms and findings that plainly indicate tuberculosis. The greatest difficulty in making a diagnosis of osteomyelitis of the os calcis is presented when diffuse acute infection complicates wounds in

the region of the heel. In these cases it may be impossible to tell whether the bone is, or is not, involved. If the changes in the soft parts are marked, and the general symptoms slight, the bone is probably not diseased. If the local and general symptoms are severe, and there is no drainage, the bone is likely to be healthy. But with free drainage from the soft parts, associated with marked general symptoms, the bone may be expected to be involved. If no drainage is present and a diagnosis cannot be made, incision of the soft parts should be first done and if this is not followed by marked relief the bone should be explored without delay. In the chronic cases, with sinus-formation and persistent discharge, the diagnosis is all but positive. The X-ray may be of value in recognizing this condition.

Treatment.—Osteomyelitis of the os calcis is a surgical disease; and its treatment should be operative. In the acute cases, the operation should be done early and should consist of drainage into the bone-structure. In the chronic cases all necrosed and diseased osseous tissue should be removed, leaving the periosteal shell. If the tendo Achillis has not already become separated from the calcaneum,—as it was in Senn's case and in one of my cases,—it should be lengthened and the foot dressed at a right angle. The bone-cavity should be packed or filled with a Mosetig-Moorhof plug. Although circumstances prevented the use of the plug in the cases herewith reported, it would seem to be indicated in operations for the chronic forms of this disease.

Operative Treatment.—So-called excision of the os calcis has received considerable attention. Sédillot's subperiosteal method is recommended by Holmes, Erichsen, Southam, Vincent, Ollier and others. The method of exposing the bone should be governed by the position and number of the sinuses in the soft parts. The inner or outer lateral straight or curved incisions are ample. Ollier made a lateral flap. Erichsen used an elliptic plantar flap. Holmes, Southam, Lund and others recommended various side incisions. It is sufficient to say that in these operations all necrotic bone should be removed and the periosteum left.

FIG. 1.



Osteomyelitis of os calcis. Photograph of foot in Case III.

FIG. 2.

X-ray of foot in Case III.

CASES.

SENN reports one case of osteomyelitis of the os calcis occurring in a "little boy." Subperiosteal resection was done and the tendo Achillis detached. More than one half of the bone was reproduced at the end of two months. The patient walking without the use of a cane or crutch. Previous wounds or injury are not mentioned.

FERGUSSON (Lancet, 1874, i, 10) reports one chronic case of osteomyelitis of the os calcis with sinus formation and sequestration. The sequestrum was removed and the patient recovered. The report is very brief and incomplete.

ZWICKE (Charité-Annalen, 1881, viii, 478) merely describes a central necrosis of the os calcis in a boy 12 years of age. The bone contained a cavity the size of a hazel-nut filled with a fungous growth. Two operations were required to effect a healing.

OWEN (Lancet, 1897, i, 37) reports a case of a boy 7 years old who had suffered for two years with osteomyelitis of the radius, ulna, tibia and os calcis. Multiple bones were operated upon. The os calcis was curetted and found to contain a pea-sized sequestrum. The boy improved rapidly but was still in the hospital two weeks after the operation had been performed.

LEBECQ (Bull. de la Soc. Anatom. de Paris, 1887, iii, 55) reports a case of osteomyelitis of the os calcis occurring, without injury, in a man 44 years old. In this case chronic pain in the heel became acute, septic symptoms developed and resulted in death. An abscess formed over the os calcis but it was not drained. Postmortem revealed pus and a sequestrum in the os calcis.

SCHINZINGER[1] reports 4 cases of chronic osteomyelitis of the os calcis. "Some had a history of an injury;" in all sinuses and sequestra were present. Subperiosteal resection resulted in a cure in each case.

CASES OBSERVED BY AUTHOR.

CASE I.—During the summer of 1902, Carl J., of Montrose, Colo., jumped on a rock, cutting his left heel. About one week later he was suffering from pain in the heel and fever. There was marked swelling, and a discharge of pus from the wound. The local and general symptoms increased in severity for 10 days, then the pain became less and an abscess developed on the inner side of the heel. This was incised. Marked relief followed. I saw the boy two months later. His general condition was fairly good: temperature normal. Two discharging sinuses were present on the inner side of the heel. These were connected by an incision, the two openings in the bone enlarged, two pea-sized sequestra extracted, and necrotic osseous tissue removed with

a curette. The wound was packed, the tendo Achillis divided in sections, and the foot dressed at a right angle to the leg. In three months the wound had healed and the boy could walk. Two years later the foot was apparently normal except for the presence of the superficial scars.

CASE II.—In 1905, a boy of 8 years stepped on a nail, wounding the right heel. At the end of three weeks his temperature was 103, and the heel painful and swollen. The family physician made a liberal incision over the inner side of the os calcis, evacuating pus. Two months later a sinus was present, extending into the bone. The os calcis was necrotic but no sequestrum was found. The dead bone was removed with a curette, the wound packed, and the foot dressed at a right angle to the leg. The wound healed in four months. One year later the foot was functionally normal.

CASE III.—Frank G., aged 11, in August, 1907, cut his right heel by stepping on a piece of glass. Infection followed, and superficial incisions were made. An abscess opened spontaneously in September, 1907, but the heel remained painful, tender and swollen. Operation was done November 15, 1907. Only a shell of the os calcis remained. Two large sequestra were removed. During the operation the tendo Achillis tore away part of the posterior periosteum of the calcaneum. The bone-cavity was packed, and the foot dressed in the proper position. In five months the healing seemed complete. On June 5, 1908, the foot is functionally normal, and the deformity not marked. The photographs are of this case.

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